Week 9: Costing and Effort Estimation

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Outline

- Group Assignment feedback
  - general comments
  - hints for the next submission
- Estimation of SE artefacts (process followed)

Group Assignment

Overall feedback:

- Well done, great job so far!
- Excellent start with Epic stories
- *Fair* is a top mark for the draft
- In the next version c1 – we will evaluate your as-is

Group Assignment

Gaps in your b-part assessment:

- Some missing sections: no Product backlog – only a paragraph given
- 80% students got the ideas in a Table format or linked to Trello

Group Assignment

Hints for next c1 assessment item:

- Identify your stakeholders
- Specify the solution overview in c1
- Must adopt feedback in c1
  - → move into the very good for c1
- For c1 we will look at EFFORT put into **Trello board**/should have expected story points
- C1 presented in a **report format**

STRUCTURE

SPECIAL LMS messages

Backlog and User story examples:

See 2/05/17 5:10pm post by Eileen

Just-in-time Task and velocity:

See 2/05/17 3:06 post by Eileen

SE PM: Costing and Effort Estimation

Estimating observations

WHEN DOES *ESTIMATION* START?

- *SW PM starts with Project planning*
- Estimation looks *into the future*
- Accept some degree of *uncertainty*
  - some 'guesstimation'

Estimations variables...

- **Estimate**: resources, cost and schedule for SW development
- Experience important+historical info
- Risky task → uncertainty
- ***Project complexity*** ~ uncertainty inherent to planning
- Complexity is relative

Estimations variables...

- ***Project size*** impact accuracy of estimates
- Decomposition to manage this
- ***Structural uncertainty*** – *RQ's solid?*
- Looking back, comprehensive metrics

Project planning objectives

- ***Project Planning (recap)***
  - A framework that enables estimation
  - Limited time frame
  - Resources, cost and schedules continuously updated through project life
  - Estimate focus: **best case** and worst case scenarios .. 'what if'...
  - Information discovery process

Project Planning with a focus on estimating

1) Software Scoping
2) Estimate the resources required for SW dev
3) Software Project Estimation
4) Decomposition techniques for estimation
5) Empirical Estimation (COCOMO)
6) Make or Buy Decisions

1) Software Scoping

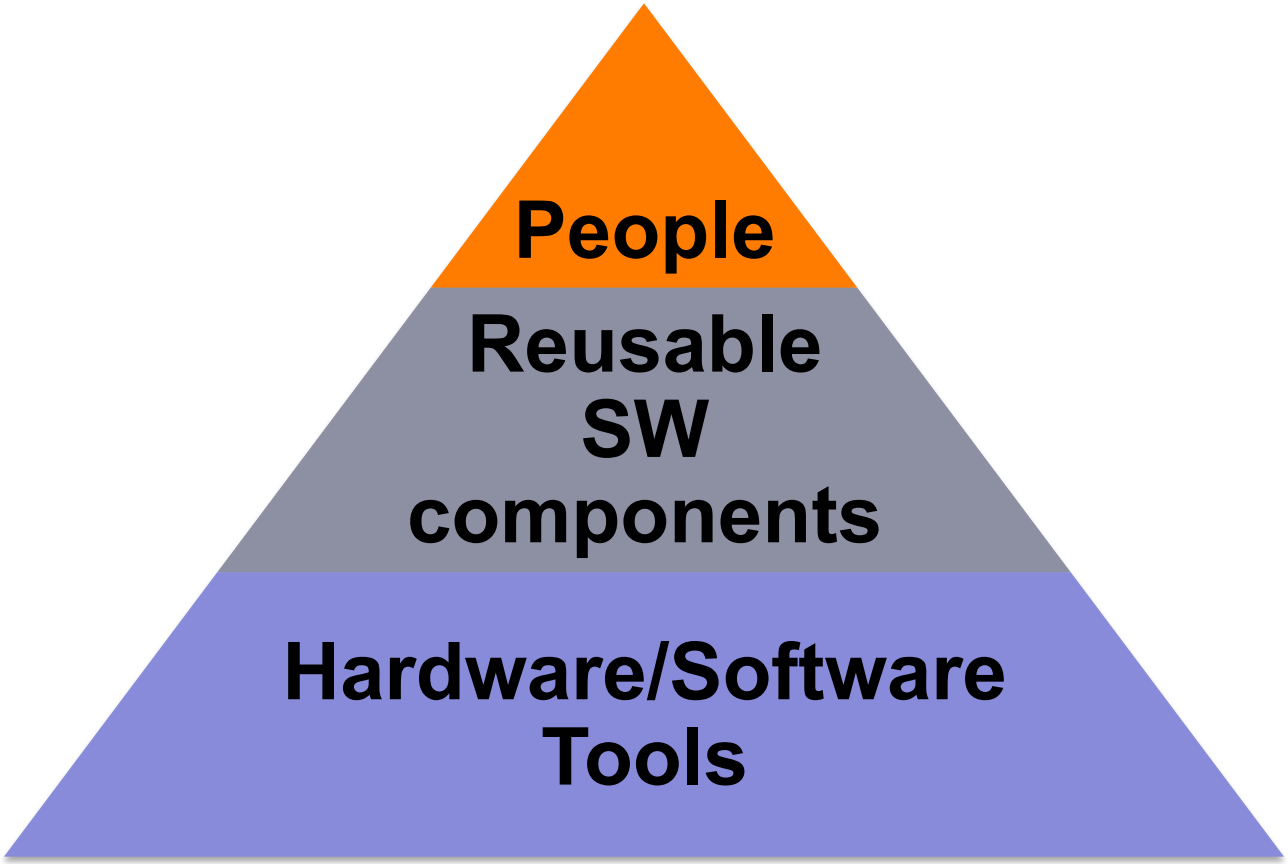
1) Scoping

- ***Determine the software scope***
  - Function and
  - Performance allocated to SW during the SE process methodology
  - Describe:
    - functions,
    - performance,
    - constraints,
    - interfaces, and
    - reliability

Scoping in your myFarmXchange case study is important

2) Estimating Resources for Software Project

2) Identifying resources



3) Software Project Estimation

3) Estimating SW project

- SW most expensive part
- SW cost & effort estimation difficult
- Reliable costs:
  1) Delay estimation until late in project
  2) Base estimates on data from similar past projects
  3) Analyse system in smaller parts, generate estimates for those
  4) Use one or more empirical models for SW cost & effort estimation
     e.g. $d = f(v_i)$

4) Decomposition Techniques for Estimation

4) Decomposition

- Accuracy of SW project estimate
  1) Degree of proper estimation of project size
  2) Ability to translate size estimate into human effort, calendar time and $$'s
  3) Degree that project plan reflects abilities of SW team
  4) Stability of product req's & supportive SE environment
- Sizing software very important

4) Decomposition

- SW Sizing:

"Quantifiable outcome of the SW project"

  - Fuzzy logic
  - Function points
  - Standard component sizing
  - Change sizing

4) Decomposition

- Problem-based Estimation:
  - LOC
  - Function points

  Both used as:
  - *1) An estimation variable &*
  - *2) Baseline metrics*
- Baseline productivity metrics - LOC/pm or FP/pm

4) Decomposition

- Expert guesstimation:
  - Use expert/best judgement
  - Prior experience
  - Different experts polled
  - Three estimates (pessimistic (p), optimistic (o) and most-likely (m)

$$e = (p + 4m + o)/6$$

4) Decomposition

- Process-based Estimation:
  - Base estimate on process to be used
  - Decompose the process
  - Starts with delineating of SW functions from project scope
  - Use functions & process activities to estimate effort (person-month)

4) Decomposition

- Parametric estimation:

(see LOC models p 86 CH 7)

$$E = a + bS^c m(\vec{X})$$

S = estimate size of system (e.g. LOC/FP)

b, c are coefficients (constants)

$\vec{X}$ a vector of the remaining cost factors (e.g. experience)

m = adjustment multiplier for these factors

5) Empirical Estimation (COCOMO)

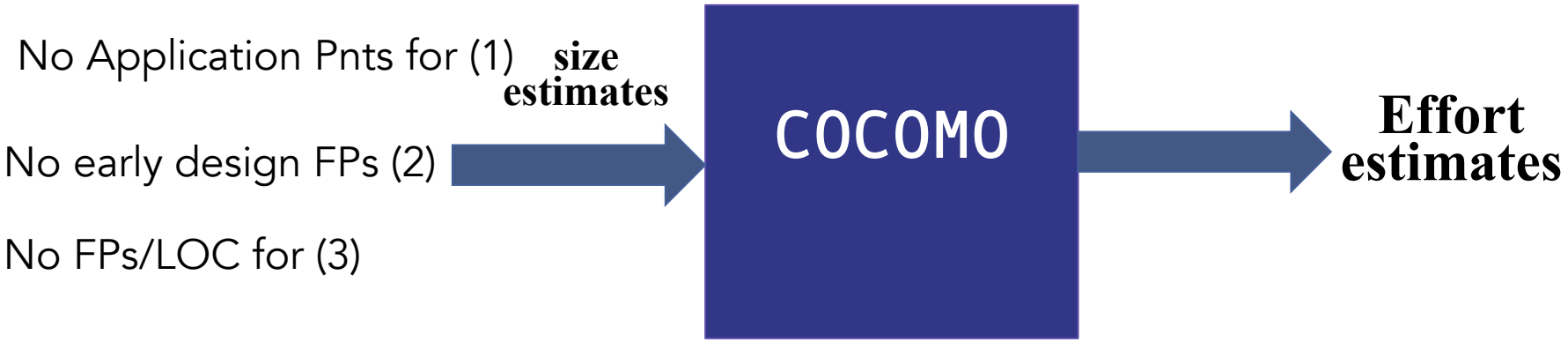
5) COCOMO

- **CO**nstructive **CO**st **Mo**del (Barry Boehm - 1981)
- Model 1: Basic
  SW dev effort & Cost – LOC
- Model 2: Intermediate
  SW dev effort & Cost =
  f (program size and set 'cost' drivers)
- Model 3: Advanced
  Intermediate with cost driver impact on each SE process step (analysis, design etc.)

5) COCOMO II

- Three different models:

1) Application composition model
2) Early design stage model
3) Post-architectural stage model



Example of Online tool
http://csse.usc.edu/tools/cocomoii.php

More COCOMO on Friday...

Week 8 Lecture 2 . . .

References:

Function Point:

http://yunus.hun.edu.tr/~sencer/size.html

COCOMO:

http://www.softstarsystems.com/cocomo2.htm